TOTAL ENUCLEATION OF THE PROSTATE.

A FURTHER SERIES OF 550 CASES OF THE OPERATION.

[WITH SPECIAL PLATE.]

BY

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SEVENTEEN and a half years have now elapsed since, in a lecture published in the JOURNAL of July 20th, 1901, I placed before the profession at large a full description of my operation of total enucleation of the prostate for radical cure of enlargement of that organ, illustrating my method by details of four cases successfully performed by me. Since then numerous papers* and lectures of mine have been published, chiefly in the JOURNAL and in the *Lancet*. In the earlier papers I recorded complete details of every one of my first 110 instances of the operation. Later, as each paper dealt with scores and then with hundreds of cases, I had to confine details to special instances illustrating some novel or important feature of the operation. Finally, in the JOURNAL of October 5th, 1912, I reviewed 1,000 cases of the operation performed by me. Since the outbreak of the war the absorbing interest attaching to communications connected with the wounds and diseases of our fighting forces have hitherto deterred me from encroaching on the limited space of our medical press. I have now completed a further series of 550 cases of the operation, and in the present paper I propose reverting to my practice of emphasizing certain aspects of the procedure by illustrative cases, dwelling particularly on its employment in advanced old age and in those conditions in which it is desirable to divide the operation into two stages—namely, (1) a preliminary suprapubic cystotomy for drainage of the bladder, and (2) enucleation of the prostate at a subsequent date.

When the operating surgeon is consulted with a view to enucleation of the prostate he will not infrequently be confronted by the fact that the patient has drifted into a stage in which the primary disease—the enlargement of the prostate—is complicated by other conditions which have undermined his constitution and seriously diminished his vital powers, thus rendering the undertaking of an operation of this magnitude a very serious matter. In cases of this kind the question will arise as to whether or not it is advisable to divide the operation into two stages—(1) a preliminary suprapubic cystotomy for free drainage of the bladder with resulting relief to the backward pressure on the kidneys, and (2) enucleation of the prostate at a subsequent date, when the kidney functions are re-established, the cystitis has disappeared, and the general health of the patient has improved. It would be extremely difficult, if not impossible, to lay down any general classification of cases in which this procedure should be had recourse to, but it is hoped that the illustrative cases that follow will help towards forming a decision on this point.

There are, however, three definite conditions in which I consider that, as a rule, it is advisable to drain the bladder before removing the prostate:

1. When the bladder is very septic, generally complicated by the presence of phosphatic calculi, and particularly when there is reason to believe that the kidneys are secondarily affected, as indicated by recurrent attacks of rigors and pyrexia with emaciation and debility of the patient.

2. When, no catheter having been previously employed, a patient consults you for intensely frequent but painless micturition with dribbling of urine, the result of an over-distended bladder. The urine in such cases will be pale and of low specific gravity (from scantiness of urea), and the patient will complain of intense thirst, with probably headache and pains in the limbs; the tongue will also probably be red, dry, and fissured, and he will complain of a bitter taste—symptoms which indicate incipient uraemia. The disease will have advanced insidiously and the patient, who will probably have informed you that he is passing urine too freely, will be astonished when on introducing a catheter one or two pints of urine are drawn off, and as much more left behind. The bladder should in cases of this kind be slowly drained by tying in a catheter of narrow calibre, and suprapubic cystotomy performed in two or three days' time, the enucleation of the prostate being deferred for a fortnight or longer, till the kidneys have regained their normal functions and all the uraemic symptoms have disappeared. The procedure here indicated is that which I almost invariably follow; but when a catheter of large calibre tied in the bladder is well borne, this method of drainage of the bladder and giving relief to the backward pressure on the kidneys may be tried; and, if the uraemic symptoms soon pass off, the urine regaining its normal specific gravity, the preliminary cystotomy may be dispensed with.

3. When rigors and pyrexia, followed by cystitis, set in after the introduction of a catheter for the first time—and this is an event that may occur in the hands of the most experienced surgeon and with the most scrupulous aseptic precautions—and urgent relief of the symptoms is required. It is never advisable to remove the prostate during an acute attack of cystitis. The catheter should be introduced frequently, or tied in if its introduction is difficult and painful, and the cystitis subdued by the usual remedies before operation is undertaken. If, however, it is found that this procedure is badly borne and cannot be followed, the bladder should at once be drained suprapubically, the enucleation of the prostate being postponed till the cystitis has disappeared and the patient has regained strength.

Personally, I do not favour the division of this operation into two stages except when absolutely necessary, as indicated by the fact that amongst 1,550 prostatectomies performed by me the two-stage operation has been undertaken in only 73 cases, or 4.75 per cent. I see no advantage in this procedure in ordinary straightforward cases, which are the general rule, and many disadvantages. Apart from the extra period the patient has to remain in bed, it is much more difficult to enucleate the prostate when deferred for ten days or longer after the cystotomy, for the tissues around the suprapubic wound will have become tense and rigid from the plastic lymph thrown out, with the result that the abdominal wall will not be soft and yielding to the hand, the finger of which is in the bladder for the purpose of the enucleation, and there will, in consequence, be difficulty in reaching the distal aspects of the prostate.

CASE 1,065.

On April 13th, 1913, I was urgently summoned to Brighton by Dr. Donald Hall to operate on a gentleman, aged 81, who had suffered from the usual prostatic symptoms for ten years, culminating in retention of urine twelve days previously. Since then he had been entirely dependent on the catheter, the introduction of which gave rise to much pain and was attended by severe haemorrhage at times.

Assisted by Dr. Hall and Mr. Ionides of Brighton, I forthwith enucleated the prostate suprapubically, a pear-shaped, symmetrical specimen, the median outgrowth in the bladder being only the size of a pea. The weight of the growth was about 4 oz., and the operation was completed in three minutes. Recovery was slow but complete, and the patient has had no urinary troubles of any kind since. On December 29th, 1918, he wrote to me: "I am thankful to report good health on this my 86th birthday."

CASE 1,083.

This gentleman, aged 75, consulted me on May 21st, 1913, on the advice of Dr. Courchet, St. Raffael, France, and of Dr. Gordon Pollock, Warlingham. In February, 1912, he had an attack of whooping-cough in the south of France, and at the time felt his clothes tight from distension of the abdomen. In June of the same year he passed much blood in the urine. Towards the end of that year he had dropsy in his lower limbs, and later on uraemic symptoms. On January 9th, 1913, Dr. Pollock by the catheter drew off 2½ quarts of urine containing blood, and since then the patient had been entirely dependent on the catheter, which had to be employed every four hours. Subsequently he consulted three surgeons in Paris, where he was laid up in a surgical home, and a catheter tied in for a week; this had the effect of diminishing the quantity of urine secreted from 4 to 2 quarts, evidently owing to the relief to the backward pressure on, and physiological rest afforded to, the kidneys. He also had his bladder washed out daily with boric and nitrate of silver lotions.

I introduced a catheter and drew off 8 oz. of pale-coloured urine, of specific gravity 1010, containing pus, but with no kidney albumin. The patient was thin but wiry, the heart being irregular and intermittent. The prostate was much enlarged.

* BRITISH MEDICAL JOURNAL, February 1st, July 26th, November 8th, 1902; April 18th, July 4th, October 17th, 1903; May 21st, October 20th, 1904; May 20th, October 7th, 1905; March 9th, October 6th, 1907; October 2nd, 1909; October 5th, 1912. *Lancet*, July 23rd, 1904; February 25th, 1905; May 1st, 1909; April 8th, 1911; April 12th, 1913.

On May 29th, Dr. Pollock assisting, I enucleated the prostate entire in three minutes. The gland, which weighed 3 oz., was hard at the centre of each lobe, but pathological examination showed that it was adenomatous and simple. On June 11th some urine was passed per urethram; by June 24th the suprapubic wound was healed, and the urine retained and passed naturally. The bladder, however, did not completely empty itself. On July 24th the patient left for the country, with instructions to pass the catheter at first daily, and then at more distant intervals, to completely empty the bladder, and thus enable it to regain its tone, which it had lost through prolonged over-distension. In the course of a few months the bladder regained its power of expelling the whole of the urine. On June 10th, 1916, this gentleman's wife wrote: "My husband is very well and bright, and works as hard as ever"; and on December 15th, 1918, the patient wrote: "The result of the operation changed my life from one of misery to one of great comfort; my health is such as I ought to be thankful for at fourscore years. I am out every day that is possible. I sleep well, seldom leaving my bed more than once instead of twenty times."

CASE 1,091.

On June 27th, 1913, I saw a gentleman, aged 79, who had come from New Zealand to consult me, on the advice of Dr. Gilbert Mirans, Wellington. Prostatic symptoms, gradually increasing, had existed for ten years, and for the last four he was entirely dependent on the catheter. The largest catheter that could be introduced was a No. 4 English scale, and this only by stiffening it by means of a metal stylet, for, in addition to the prostatic enlargement, a stricture of the urethra was present. The introduction of the catheter was attended by much pain and frequently by bleeding; it had to be employed six times daily, and on each occasion it took half an hour to empty the bladder owing to the small calibre of the instrument. The prostate was felt bimanually to be greatly enlarged, particularly in the bladder. The general health was poor, the heart intermittent and irregular, the feet swollen, the urine contained pus and albumin, and the patient suffered from troublesome psoriasis.

On June 30th, Dr. W. E. Herbert of Wellington, N.Z., being present, I performed an internal urethrotomy, and then enucleated the prostate entire with great ease. The operation was well borne and unaccompanied by shock, but was followed for twenty-four hours by vomiting of dark grumous matter, the pulse though irregular remaining strong. Convalescence was rapid; on July 15th some urine was passed by the urethra, and on July 26th the wound was dry, the whole of the urine being retained and passed naturally from this date. In the end of August, about a month after passing from under my care, the patient had a paralytic stroke, due, apparently, to his motoring fifty or sixty miles daily; but from this he recovered. On June 14th, 1914, he wrote from New Zealand: "I have no bladder trouble and, save for a weakness in the left leg, I am well in health, have a good appetite and enjoy sound sleep"; and on March 15th, 1915: "Not only has the removal of the prostate gland been a complete success but the psoriasis has disappeared."

The prostate from this case, which weighs 8¼ oz., is shown in the figure (special plate). It is a remarkable specimen, one of the most interesting in my possession, presenting an enormous outgrowth in the bladder.

CASE 1,132.

The patient, aged 84, was admitted to St. Peter's Hospital, November 14th, 1913, with prostatic symptoms which had existed fourteen years; he had been dependent on the catheter for five years and was in great distress, almost worn out from pain and constant desire to micturate. The urine contained pus and mucus from chronic cystitis.

On November 19th I enucleated the prostate, weighing 6 oz. A rapid recovery ensued, the patient being discharged on December 22nd in fairly good health. On July 24th, 1916, the patient's wife wrote me: "My husband is enjoying very good health and has not the slightest return of the trouble for which you operated on him: he is taken for 70 instead of 86!" And on October 17th, 1918: "Everything is quite normal as regards the operation performed in 1913."

CASE 1,257.

This gentleman, aged 64, sent by Dr. W. G. Sargent, Padstow, Cornwall, I examined on June 29th, 1915. Prostatic symptoms had existed fifteen years, and during the last three years he was entirely dependent on the catheter, which had to be introduced every three or four hours. The urine contained much pus and blood, and was extremely offensive. The general health was extremely bad, the heart being intermittent and irregular, and the skin was of a bluish-grey colour, the result of septic absorption from the bladder. The temperature varied up to 102° F.

On July 1st I opened the bladder suprapubically and removed seven faceted phosphatic calculi, weighing nearly 3 oz. The prostate was extremely large, fully one half of it projecting in the bladder. As the patient was extremely weak, and suffering from sepsis, I postponed enucleation of the gland, and contented myself with temporary drainage of the bladder.

By July 6th the patient's health had vastly improved, the pyrexia had disappeared, and the urine was inoffensive, so, on July 7th, I enucleated the prostate, which weighed 8¼ oz. The operation was well borne, and convalescence rapid, the wound being closed on July 23rd. On August 16th the patient returned to Cornwall, able to retain and pass his urine normally, and on August 18th Dr. Sargent wrote: "Such a result was beyond anything I anticipated, for the case had assumed a very grave aspect, and the general health was at a very low ebb." On July 2nd, 1916, a year after the operation, the wife wrote: "My husband has made a great recovery. He is free from pain and urinary troubles, from which, as you know, he suffered for many years"; and on August 1st, 1918: "My husband is in splendid health, and looks so well."

CASE 1,266.

Captain X., aged 72, sent by Dr. D. M. Davies, Aberayron, on August 4th, 1915, suffering from prostatic symptoms for four years; completely dependent on the catheter for six months; urine contained much pus and blood, and was very offensive. The bladder had been washed out twice daily for many weeks. The prostate presented in the rectum as a large, rounded, dense tumour, with median furrow, like the buttocks of a 7-months fetus. Bimanually it was felt as a large rounded movable tumour in the bladder, projecting above the pubes. The patient's general health was fair.

On August 6th, Lieut.-Colonel G. Bull, I.M.S., being present, I opened the bladder suprapubically, and found that about two-thirds of the bulk of the prostate lay in the bladder. It was gutter shaped, with the lateral lobes lying apart, the distorted urethra, carried by the growth up into the bladder, forming a deep vertical slit. I enucleated the gland, weighing 12½ oz., entire, the operation lasting eight minutes. The incision in the abdominal wall was only 3 in. long and that in the bladder only 2½ in., the prostate being of the soft, compressible, adenomatous type, and being delivered from the bladder like an open bivalve. There was scarcely any bleeding, no shock, and the patient complained of no pain; in fact, as he repeatedly stated, he never felt the operation. The progress of the case was uneventful, the wound being closed on August 27th, and the patient returned home on September 9th in good health, able to retain and pass his urine as well as ever. On September 26th Dr. Davies wrote: "I am extremely pleased with the result of the operation. He is remarkably well and has good control of his sphincter." On December 13th, 1918, the patient wrote me: "I am glad to tell you I feel as well as when I was eighteen."

The prostate, a fine specimen, shaped like a small shrapnel shell, has been placed in the museum of the College of Surgeons, London.

CASE 1,274.

The patient, aged 48, was admitted to St. Peter's Hospital, September 20th, 1915, with the usual symptoms of enlarged prostate, which had existed six months, the most marked of which were great frequency of micturition and loss of control of the urine at night. The bladder was distended, containing about two pints of urine. The prostate was felt enlarged per rectum and bimanually, and of the usual adenomatous type. There was marked loss of flesh during the previous two months, and the patient's general health was very indifferent.

On September 22nd I enucleated the prostate entire in its capsule, a good specimen (now in the College of Surgeons Museum), weighing 1½ oz., presenting a scoop-shaped lip in the bladder. On October 8th the patient was discharged, able to retain and pass urine normally but still in indifferent health. On August 10th, 1916, he wrote me: "I am delighted to tell you that I am at last in the best of health."

This (48 years) is the lowest age at which I have enucleated an adenomatous prostate, and only in four instances at this age.

CASE 1,281.

The patient, a fine old soldier, aged 84, who had served in the Crimean war, was admitted to St. Peter's Hospital October 3rd, 1915, suffering from prostatic enlargement and stricture of the urethra. Twenty years previously he had a stone crushed in the bladder. Eighteen months before admission he had retention of urine, and since then he was entirely dependent on the catheter. Owing to the stricture the size of the catheter was limited to No. 5 of the English scale. The urine contained pus and blood, but the patient's general health, considering his great age, was good.

On October 6th I dealt with the stricture by internal urethrotomy and then enucleated the prostate suprapubically. The gland, which weighed 2 oz., was very dense. A rapid recovery ensued, the patient being discharged on October 29th—twenty-three days after operation—retaining and passing his urine as well as he ever did. On July 23rd, 1916, the patient wrote me that he was in good health. Subsequent to the operation he worked as a recruiting sergeant. On December 27th, 1916, he came to see me; he was then in good health in his 86th year.

CASE 1,309.

This patient, a well known public man, aged 76, consulted me on December 21st, 1915, introduced by Dr. Douglas, Camden Road, London. The usual prostatic symptoms had existed only one year. There was intense frequency of micturition by day and night, but no pain or other discomfort. I found that the bladder was overdistended, reaching as high as the umbilicus, and on passing a catheter I drew off 35 oz. of urine, leaving a large quantity behind. The urine was pale, like water, the

specific gravity being only 1002; albumin *nil*. The prostate was considerably enlarged, bilobed and very dense at parts; general health indifferent.

Owing to the low specific gravity of the urine and insufficient action of the kidneys from prolonged backward pressure, I decided to drain the bladder in the first instance and defer to a later date the enucleation of the prostate.

The bladder was opened suprapubically on December 23rd and a large drainage tube inserted. The patient bore this comparatively slight operation very badly and was for some days in a very precarious condition. Then he rapidly improved, and on January 26th, 1916, I enucleated the prostate entire. It was adenomatous, pear-shaped, and weighed 2 oz. This second operation was well borne and convalescence was rapidly established, the patient leaving the surgical home on March 6th in fairly good health, retaining and passing his urine normally. I have met this gentleman on several occasions since, looking remarkably well and attending to his parliamentary duties. He has had no urinary troubles since. On September 25th, 1917, he wrote me: "I am enjoying very good health"; and on December 10th, 1918: "I am very well."

CASE 1,310.

On January 26th, 1916, I was called to see this gentleman, aged 67, in consultation with Drs. J. S. Part of Chiswick and T. H. Bishop of Bedford Park. For two years he had suffered from prostatic symptoms, with, latterly, intense frequency of micturition. Three days previously a catheter had been passed and 85 oz. of urine drawn off. The evening before I saw him it was found impossible to introduce the catheter. With considerable manipulation I managed to pass a No. 16 French *coudé* and draw off 82 oz. of urine containing much pus. The tongue was foul, the pulse weak, and the patient was wretchedly ill, unable to move on the couch on which he was lying. The prostate was felt per rectum to be very large and of the usual adenomatous type, but it could not be felt bimanually owing to the stoutness of the patient.

Owing to the large quantity of pus and albumin in the urine and the weak condition of the patient, I decided to drain the bladder suprapubically in the first instance, and to remove the prostate later on. The former operation I performed in a surgical home on January 27th. By February 7th the patient had wonderfully improved in health, so next day I enucleated the prostate, a fine specimen of the scoop-shaped pattern, very prominent in the bladder, and weighing 5 oz. The anaesthetic and operation were well borne. On February 29th the patient left the surgical home in fairly good health, able to retain and pass urine normally. On August 28th he wrote: "I am in better health than I have been for years, and have no trouble with my waterworks." On September 15th he called to see me in perfect health. I heard from him on December 12th, 1918, that he was in excellent health, and in the active pursuit of his profession.

CASE 1,358.

This gentleman, aged 85, consulted me August 2nd, 1916, on the advice of Dr. J. Uhthoff, Brighton. He had seen military service in the Indian Mutiny and Persian war, but had passed the greater portion of his life in South America. His prostatic symptoms dated back fifteen years, culminating in retention of urine a year ago, since when a silver catheter was passed twice daily by an attendant, latterly with much difficulty, pain, and bleeding. For the last three months he was practically confined to bed, but had to rise every hour or less for urination, which was attended by straining and scalding. The urine was of low specific gravity, 1008, and contained much pus and some blood. Three months previously he had a slight stroke of paralysis, accompanied by loss of speech for three days. He had double inguinal hernia. The prostate was large and adenomatous, and, though no stone was detected by the sound, I suspected the existence of one behind the prostate.

On August 7th I enucleated the prostate, which weighed 3½ oz., and found a small oval urate stone, weighing 22 grains, in the bladder. The operation, which lasted only three minutes, was well borne. Some urine was passed per urethram on August 17th, and the wound was closed on August 19th. The patient left the surgical home for Brighton on September 1st —twenty-five days after the operation—in fairly good health, able to retain and pass his urine normally. I saw him some months after in fairly good condition, untroubled by any urinary symptoms. I heard that he died some months later from heart and kidney troubles.

The rapidity of cure in this case, considering the great age and the debilitated condition of the patient, as well as the fact that the kidneys were affected, is, indeed, remarkable. I attribute success in such cases largely to rapidity in operating, thus reducing the time under the anaesthetic to a minimum.

CASE 1,429.

General H., aged 70, first consulted me in 1913, suffering from symptoms of enlarged prostate. Though the gland was considerably enlarged the symptoms were so slight that I refrained from passing a catheter, and advised postponement of any operative interference. He did not consult me again till June 6th, 1917. The symptoms had gradually increased in intensity, so that he had now to pass urine every hour and a half by day and night. A sterilized catheter was introduced and 12 oz. of residual urine drawn off. The prostate was felt bimanually the size of a large orange, and of the usual adenomatous type. Next day he had pyrexia followed by cystitis. The intense frequency of micturition and the pain caused by the introduction of the catheter were so great that I tied in the catheter; but this gave little or no relief, the inflamed bladder resenting the presence of the catheter. I therefore drained the bladder suprapubically on June 12th, but, owing to the fever and weak state of the patient, I postponed removal of the prostate. The temperature soon subsided and the urine became normal, and on June 25th I enucleated the prostate, which weighed 4 oz. The suprapubic wound closed on July 9th, and the urine was passed normally after that date. On December 4th, 1917, the patient wrote: "I am perfectly well; I feel that you have given me a new lease of life"; and on December 6th, 1918; "I am doing well, and have no trouble or discomfort."

CASE 1,477.

Gentleman, aged 82, seen at Ipswich February 28th, 1918, in consultation with Dr. E. Hollis, Woodbridge. Prostatic symptoms had existed for seven years. Catheter employed twice daily for last fortnight. Cystitis, with temperature 103° F., supervened after commencing the catheter, but this had now subsided, though the urine contained pus, and urination was painful. The general health was feeble. Assisted by Dr. Hollis, I enucleated the prostate in three minutes; weight 3 oz. The patient made an uninterrupted recovery, and on March 24th Dr. Hollis wrote: "The patient has done well, the general condition is good, and he intends to return home in a few days." On December 19th the patient wrote me: "I am quite recovered, and have had no further urinary troubles."

CASE 1,484.

C. F. C., aged 80, was admitted to St. Peter's Hospital, March 2nd, 1918, with acute retention of urine, the bladder being distended to the umbilicus, due to prostatic obstruction. He complained of thirst and headache, and the tongue was red, dry, and fissured, denoting incipient uraemia. A catheter was passed and tied in and the bladder slowly drained. On March 6th I performed suprapubic cystotomy for drainage of the bladder preparatory to prostatectomy at a later date. The uraemic symptoms gradually subsided and the patient's general state was so improved that on March 20th I was enabled to complete the operation by removing the prostate, which was adenomatous and weighed only 1½ oz. The suprapubic wound was slow in healing, but was finally closed on May 6th. On May 11th the patient was discharged in fairly good health, able to retain and pass his urine normally. On December 11th, 1918, he wrote to me: "I am pleased to say that I feel remarkably well and have no set-back since leaving the hospital."

CASE 1,490.

Dr. McR., aged 80, consulted me on March 22nd, 1918, on the advice of Major A. Neve, R.A.M.C. Prostatic symptoms had been gradually increasing for three years, culminating in complete retention of urine the night before, when the catheter was passed and two pints of urine drawn off. Though he had since passed some urine naturally I drew off 32 oz., specific gravity 1008, with more than a trace of albumin. The feet were oedematous, the tongue glazed, dry, and fissured, and the patient was suffering from intense thirst. I sent him forthwith into a surgical home and tied in a catheter to drain the bladder continuously. This was well borne; the uraemic symptoms rapidly subsided and the general condition was so much improved that, on April 8th, Major Neve assisting, I enucleated the prostate, which weighed 1½ oz. and contained numerous minute calculi. The patient scarcely felt the operation, made a rapid recovery, and left the surgical home on May 3rd in excellent spirits, able to retain and pass urine as well as he ever did. On October 10th he wrote: "I am all right and have resumed my London engagements." I have recently seen him, in excellent health, untroubled by any urinary symptom.

In this case the overdistension of the bladder coming on slowly and causing backward pressure on the kidneys, resulting in the early symptoms of uraemia: there was no necessity for dividing the operation into two stages, as the tying in of the catheter was well borne, and the relief thus afforded enabled the kidneys to recover their normal functions, and the uraemic symptoms to disappear before undertaking the enucleation of the prostate.

CASE 1,501.

Colonel P., aged 80, consulted me on March 6th, 1918, on the advice of Dr. G. D. McReddie, Greenhithe. The usual prostatic symptoms had existed for twelve years. The residual urine contained pus and albumin. On May 13th, Dr. S. H. Curry being present, I enucleated the prostate, which weighed 2¾ oz., the operation lasting three minutes. An uneventful recovery ensued, the patient leaving the surgical home on June 28th, in good health, able to retain and pass urine normally. He called to see me on December 13th, 1918, in excellent health, untroubled by any urinary symptom.

The age in the 1,550 cases of total enucleation of the prostate now performed by me ranged from 48 to 90 years, the average age being 69; and the prostates removed weighed from ½ to 17 ounces.

There were in connexion with these operations 83 deaths, or 5½ per cent., the mortality diminishing from 10 per cent. in the first 100 to 3 per cent. in the last 200 cases.

There were 89 octogenarians between 80 and 90 years of age, and 13 bordering on this age, in their eightieth year. Amongst these there were 12 deaths, or 11¾ per cent.

In 274 instances the prostatic enlargement was complicated by the presence of stone in the bladder, mainly of the phosphatic variety, due to cystitis, the calculi varying in number from one to hundreds; and in one case, reported in the *Lancet*, April 12th, 1913, there were sixteen calculi weighing 8 oz. Amongst these 274 patients there were 21 deaths, or 7½ per cent. I may draw attention to the fact that, though the operation in these cases involved a suprapubic lithotomy as well as enucleation of the prostate, the whole of the mortality has been accepted in connexion with the latter.

It will have been observed that in practically all the cases detailed in this paper—and they are typical of scores of others—the prostatic disease had been allowed to advance to such a degree that grave complications had supervened before surgical relief was sought. It is, of course, mainly amongst cases of this kind that a fatal result occasionally follows operation. I would, therefore, once more appeal to the profession at large to advise early operation, before the vital organs, and particularly the kidneys, become secondarily affected. When undertaken whilst the general health is sound and the kidneys unaffected there is scarcely any danger attached to this operation in experienced hands, even in advanced old age.

A NOTE ON THE STATE OF THE URETERS AND THEIR ORIFICES IN CASES OF GUNSHOT WOUNDS OF THE SPINE.

BY

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ONE of the most frequent causes of death in cases of gunshot wounds of the spine is infection of the bladder and kidney, attributable in most cases to the use of the catheter for retention of urine. It is well known that obstruction to the urinary outlet is a predisposing cause of infection, and this state of affairs is present to a certain degree in spinal injuries. Fearnsides[1] points out that after gunshot wounds of the spinal cord complete retention occurs in practically every case, commencing from the date of injury and lasting for a variable time. During this period a lax condition of the bladder musculature as a whole is found, accompanied by a considerable amount of spasm at the neck of the bladder, and of the urethra. To the first stage of complete retention there succeeds, after days, weeks, or months, a second stage of periodic spontaneous micturition or of active reflex incontinence which is entirely involuntary.

It is important to ascertain whether any relaxation or paralysis of the ureters or their sphincters is present in view of the frequency of "ascending" infection of the kidney. If it could be demonstrated that incompetence of the uretero-vesical sphincter and dilatation of the ureter occurs it would be easy to understand the frequency of kidney involvement following on bladder infection. A few observations were made in 1916 with the object of clearing up this point, but for various reasons their publication was delayed. It has been assumed that ascending infection of ureters and kidneys may be due to paralytic relaxation of the ureteric sphincters,[2] and as my observations bear on this subject I have thought it well to record them so that they may be corrected or confirmed by those interested.

It is easy to see how regurgitation of infected bladder contents into the renal pelvis could take place if the uretero-vesical orifice and the walls of the ureter were paralysed or relaxed. The object of this article is to show that there is no evidence that such a state of affairs is present. Physiologists are familiar with the fact that the ureters can carry on their functions independently of the central nervous system by virtue of an intrinsic neuromuscular or muscular mechanism upon which their rhythmical movements depend, and this is to be expected as the ureter simply serves as a channel down which urine secreted by the kidney is propelled to the reservoir provided for its reception until a convenient opportunity offers for its discharge from the body. Elliott,[3] experimenting on the innervation of the bladder and urethra in animals, incidentally investigated that of the ureter, but could not find any proof of the control of its peristalsis by the sympathetic nerves. The spinal segments connected with the ureters are the tenth, eleventh, and twelfth thoracic (Head). Cases with injury at or above this region were therefore chosen for investigation.

CASE I.—*Cervical Region.*

Pte. K., wounded with high explosive, September 17th, 1916. Complete lesion of the cord at the level of the fifth cervical segment. Complete retention of urine. The patient had been catheterized. Cystoscopy, September 22nd, five days after injury. Intramuscular injection of indigo-carmine. Colour did not appear in half an hour, though ureters discharged clear urine in jets, with normal movements of the ureteral orifices. The blue colour of indigo-carmine came through later in the day and the urine remained tinted for twenty-four hours. A mild cystitis was present. The delay in the appearance of the dye was doubtless due to the serious general condition of the patient who died two days later. *Post-mortem* examination revealed complete lesion of the cervical cord.

CASE II.—*Upper Dorsal Region.*

Pte. G., wounded by bullet, August 22nd, 1916. Diagnosed as a complete lesion of the cord at level of fourth dorsal segment. The patient had been catheterized for complete retention. Cystoscopy, August 24th, two days after injury. Already there was extensive cystitis, with ecchymoses, which formed slate-coloured patches in places. Ureteral orifices buried in oedematous mucous membrane. Intramuscular injection of indigo-carmine. No colour at end of thirty-five minutes, when a second injection was given. Ten minutes later colour appeared at both orifices. The urine issued in jets, which were short and abrupt and not definitely finished off as in a normal case. The area round the ureteral orifice moved only slightly upon closure of the latter. The alteration in behaviour of the ureteral orifice was probably due to the swelling of the mucous membrane present. The jets were irregular in rhythm, the intervals varying on the right side from two to thirteen seconds, and on the left from twelve to thirty-eight seconds. There was no escape of urine from the ureteral orifices in the intervals between the jets.

CASE III.—*Mid-dorsal Region.*

Pte. W., wounded with shrapnel ball, August 27th, 1916. Diagnosed as a complete lesion of the cord at level of sixth dorsal segment. Complete retention of urine. Catheter twice a day. Evening temperature varied from 103° to 104° F. Cystoscopy, September 1st, four days after injury. Intramuscular injection of indigo-carmine. Coloured urine emitted ten minutes later. Very vigorous jets from both ureteral orifices, with normal movements of the latter. Rhythm very irregular, three minutes elapsing on one occasion between two successive jets. At other times the rate was much more rapid. A mild degree of cystitis was present.

CASE IV.—*Lower Dorsal Region.*

Sergeant K., gunshot wound in dorsal region. Admitted base hospital, August 16th, 1916. Diagnosed as a complete lesion of the cord at the level of the eighth dorsal segment. Complete retention of urine, for which the patient had been catheterized. Cystoscopy, August 18th, a few days after injury. Slight degree of cystitis. Ureteral orifices perhaps slightly patulous. Intramuscular injection of indigo-carmine. Twelve minutes later coloured urine appeared in jets which were not very vigorous. No leakage from orifices of ureters in the intervals between jets.

CASE V.—*Lower Dorsal Region.*

Pte. K., wounded by shell, June 25th, 1916. Diagnosed as a complete lesion at level of tenth dorsal segment. Complete retention for which patient had been catheterized. Cystoscopy, a few days after injury. Small punctate ecchymoses. Floating flecks of muco-pus. Cystitis. Ureteral orifices appeared to be patulous, but there was distinct systole and diastole of the uretero-vesical sphincter. Intramuscular injection of indigo-carmine. Eight minutes later coloured jets with a thin stream appeared at intervals of twenty seconds.

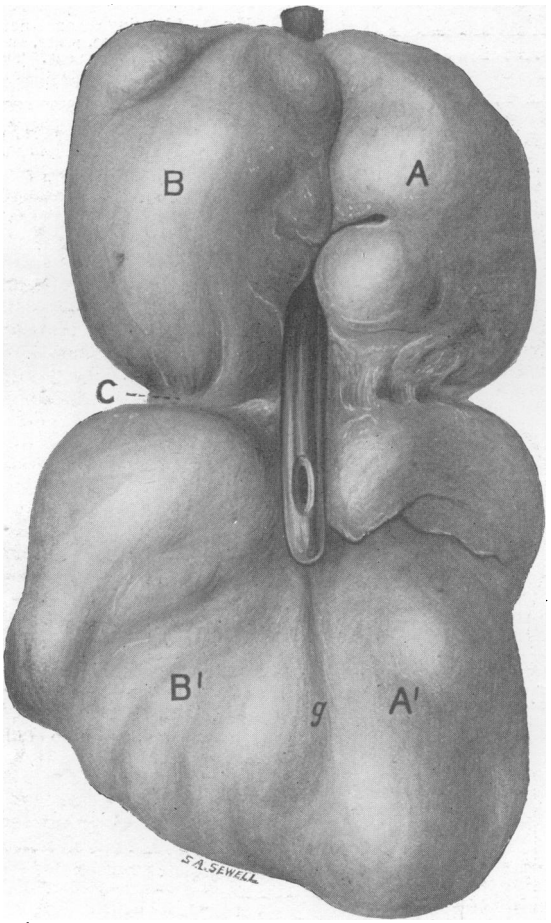
Indigo-carmine was used in these cases to study more easily the shape and size of the issuing stream and to ascertain if any leakage occurred through an incompetent valve.

CONCLUSIONS.

A study of the foregoing cases justifies the conclusions that in complete transverse lesions of the cord in the cervical and dorsal regions, examined a few days after injury:

1. Peristalsis of the ureters continues, as evidenced by the rhythmical discharge of urine rendered more visible by indigo-carmine.
2. Normal movements of the lips of the ureteral orifice take place, as evidenced by the visible systole and diastole present in all the cases.

SIR PETER FREYER: TOTAL ENUCLEATION OF THE PROSTATE.



Prostate weighing 8½ oz. removed from patient aged 79 (Case 1,091). A, Right lobe. B, Left lobe. A' B', Outgrowth in the bladder, springing equally from both lobes, the furrow *g* showing the posterior commissure of prostate. The neck c was caused by the grip of the upper margin of the prostatic sheath, or recto-vesical fascia, and sphincter muscle of bladder.